



ORIGINAL ARTICLE

Blood pressure is associated with body adiposity indicators in children aged 4 to 7 years[☆]



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KEYWORDS

Blood pressure;
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Abstract

Introduction and Objective: Studies in adults have shown an association between increased adiposity and hypertension, but few studies have analyzed this association in childhood. The aim of this study was to investigate the association between blood pressure (BP) and body adiposity indicators in children, controlling for the variables of birth conditions, sociodemographics, lifestyle and diet.

Methods: In this cross-sectional study of 399 children aged 4 to 7 years, the dependent variable was BP, measured according to the protocol established by the 7th Brazilian Guidelines on Hypertension. The explanatory variables of the study were waist-to-height ratio (WHtR) and body mass index (BMI). Multiple linear regression was used to assess the independent association between adiposity and BP indicators adjusted for the variables of birth conditions, sociodemographics, lifestyle and diet. Statistical significance was set as $\alpha=5\%$.

Results: BMI for age and WHtR correlated positively with systolic (SBP) and diastolic blood pressure (DBP). After multivariate analysis, higher values of BMI (model 1) and WHtR (model 2) were associated with increased SBP and DBP.

Conclusion: Increased body adiposity, as assessed by BMI and WHtR, was associated with increased SBP and DBP among the children studied. Thus, we suggest the use of BMI and WHtR in the nutritional assessment of children to detect changes in BP and other cardiometabolic risk factors in this population.

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PALAVRAS-CHAVE

Pressão arterial;
Adiposidade;
Criança

A pressão arterial está associada a indicadores de adiposidade corporal em crianças de quatro a sete anos

Resumo

Introdução e objetivo: Estudos feitos com adultos têm demonstrado associação entre aumento da adiposidade corporal e hipertensão arterial, mas ainda são escassos estudos que avaliaram essa associação na infância. O objetivo deste estudo foi investigar a associação entre pressão arterial e indicadores de adiposidade corporal em crianças, controlada por variáveis de nascimento, sociodemográficas, de estilo de vida e dietéticas.

Métodos: Estudo transversal com amostra de 399 crianças de quatro a sete anos. A variável dependente foi a pressão arterial, aferida de acordo com protocolo estabelecido pela VII Diretriz Brasileira de Hipertensão Arterial. As variáveis explicativas do estudo foram os índices relação cintura-estatura (RCE) e índice de massa corporal (IMC). A regressão linear múltipla foi usada para avaliar a associação independente entre indicadores de adiposidade e pressão arterial, ajustada por variáveis de nascimento, sociodemográficas, estilo de vida e alimentação das crianças. Considerou-se como significância estatística $\alpha=5\%$.

Resultados: O IMC/I e a RCE correlacionaram-se positivamente com a pressão arterial sistólica e diastólica. Após as análises múltiplas, os maiores valores de IMC (modelo 1) e RCE (modelo 2) se associaram ao aumento da pressão arterial sistólica e diastólica.

Conclusão: O aumento da adiposidade corporal, avaliada pelo IMC e pela RCE, associou-se ao aumento da pressão arterial sistólica e diastólica entre as crianças avaliadas. Assim, sugere-se o uso do IMC e da RCE na avaliação nutricional de crianças, para *screening* de alterações na pressão arterial e outros fatores de risco cardiometabólico nessa população.

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Introduction

Hypertension is an independent, linear and continuous risk factor for cardiovascular disease. It can also lead to various other disorders, including cerebrovascular disease, coronary artery disease, heart failure, chronic renal failure and peripheral vascular disease.¹ According to data published by the World Health Organization (WHO), in 2012 there were about 600 million people with hypertension worldwide, with similar prevalences in developed and developing countries.²

Studies have shown that hypertension can begin early in life, and that elevated blood pressure (BP) tracks from childhood to adulthood.^{3,4} According to a systematic review, the prevalence of high BP in children and adolescents worldwide ranges between 0.46% and 20.3%.⁵ Essential HT (with no identifiable cause) in childhood may be the result of interactions between genetic and environmental factors, such as familial hypertension, birth conditions, nutritional status, diet and lifestyle.⁶⁻⁸

The significant changes in dietary and nutritional patterns in contemporary populations are seen as part of a process called the nutrition transition.^{2,9} In this view, the high prevalence of overweight and adiposity in children is directly related to the increased prevalence of essential HT in childhood.^{6,10} Among the mechanisms put forward to explain this relationship are abnormal insulin metabolism, increased sympathetic tone, structural and functional vascular alterations, increased platelet aggregation and oxidative insult, in addition to sleep disorders.¹¹

Despite their limitations, measurement of anthropometric indicators to assess nutritional status have become the most practical and least expensive way to assess both individuals and populations, whether for clinical interventions, for screening purposes, or for monitoring trends.¹² Body mass index (BMI) and waist circumference, as well as derived indices such as the waist-to-height ratio (WHtR), are the most commonly used parameters in studies assessing nutritional status and adiposity, and are associated with various cardiovascular risk factors, including high BP.^{6,13,14}

Few studies have assessed the relationship between easily measured and low-cost body adiposity indicators, such as BMI and WHtR, and BP in children. In most studies the samples have broad age ranges, including adolescents, which makes it difficult to assess and interpret this relationship in children.^{8,13,15}

In view of the above, the aim of this study was to assess the association between body adiposity indicators and BP in children, controlling for the variables of birth conditions, sociodemographics, lifestyle and diet.

Methods

This was a cross-sectional study of children from a retrospective birth cohort at the only maternity hospital in Viçosa, Minas Gerais, Brazil. The children were monitored via the *Programa de Apoio à Lactação* (Breastfeeding Support Program, PROLAC) during the first year of life and reassessed at 4-7 years of age. PROLAC is an extension program of the Universidade Federal de Viçosa (UFV), in partnership

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